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LIGHTING DATA

BULLETIN LD 132B



Lighting for the Modern Store *lighting*

EDISON LAMP WORKS
OF GENERAL ELECTRIC COMPANY

GENERAL SALES OFFICE
HARRISON, N. J.



Lighting for the Modern Store

Information Compiled by
A. L. POWELL
Engineering Department



Main floor of one of the most recently completed department stores in the country. One outlet is provided in the center of each bay and 500-watt MAZDA C lamps are used in color-modifying enclosing globes. An ornamental fixture in harmony with the ceiling decoration is employed. Suspending the units about 8 feet below the 20-ft. ceiling gives the effect of good proportions.

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For information regarding MAZDA lamps and lighting questions, refer to the nearest sales office, as listed on the last page of this bulletin.

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MRS. G. OHNT



Standard types of lighting fixtures would certainly be out of place in a display room of this character where exclusive millinery and gowns are exhibited. It will be noted that the whole interior resembles a reception hall or salon. At the sides of the room will be noted wall cases where individual items are displayed under high level illumination from concealed equipment. The mannequins enter through the curtained portal and the miniature stage is also brilliantly illuminated so that the first impression is very striking. The units for general lighting are of the cut crystal variety, each fixture having eight 50-watt MAZDA lamps in a cluster. Since outlets are on centers 12 by 18 feet, a high level illumination suited for the careful inspection of the gowns prevails.

Lighting for the Modern Store

*Information Compiled by A. L. Powell
Engineering Department*

Why is Proper Lighting a Necessity?

Through suitable lighting customers are drawn to a store, and sales increase. Any normal individual will patronize the store which is cheerful and inviting rather than the one which is gloomy and dingy. The tendency of the times is toward progress. A well lighted store is prima facie evidence of the progressiveness of the management.



Night view of a prominent New York store whose lighting equipment is distinctive yet not unduly elaborate. A spherical enclosing globe of diffusing glass is broken into sections by metal ribs of a bronze finish. One 500-watt MAZDA lamp is used in each bay.

One can form a mental picture of two stores. The first, with windows unwashed, shelves dirty, one or two lamps without reflectors, or in fixtures that were obsolete a decade ago; the second, clean, well painted, and lighted to a proper intensity with modern equipment. One naturally assumes that in the first store the turnover will be low and such stocks as are found will be stale or out of date,

while, in the second, the shelves will be well filled with fresh goods and one can purchase what he desires. The thought arises that the first store must be on its last legs, about to go into bankruptcy. When it does, people will say of the proprietor, "He could not keep up with the times."

Without artificial lighting a store of any appreciable size would not be an economic possibility. Space is too valuable in the cities to design a building in such a way that adequate daylight can penetrate a great distance from the street. The continuous use of lighting equipment is a necessity.

The advertising feature of lighting which compels attention has been recognized for a long while; hence our white-ways, bright show windows, and sparkling electric signs. If your store is well illuminated, it will draw the crowd.

Good lighting puts the customer in a pleasant frame of mind. It makes sales work easier, and this, in turn, helps to keep clerks and employees cheerful and courteous.

It has been quite conclusively proved, in connection with tests on show windows, that high level lighting in the window causes more of the people on the street to stop and look at the display. Similar tests indicate that the sales per customer are appreciably higher with fairly bright illumination than when the heretofore average lighting is employed.

The health of the clerks is to a degree dependent on the lighting system, and this factor must receive careful consideration.

Bright illumination reduces the opportunity of the shoplifter, for her motions become much more easy to detect.

Good lighting makes sales work easier. It gives the customer the opportunity to examine goods in detail and establishes confidence, resulting in satisfied customers, and far less returned or exchanged merchandise.

There is another psychological effect of the well lighted store, particularly one handling foodstuffs. We always associate light with cleanliness. Dirty conditions are not likely to exist if the accumulation of dust is visible. One insists on buying his food under sanitary conditions.

In general there is a tendency to give too much weight to the costs of store lighting. It is true that economy must be practiced all along the line if a merchant desires to be successful. Effective lighting will actually reduce the total costs of operation. Such

remarkable returns can be secured per dollar invested in lighting, compared with the same amount spent in other channels, that it is difficult, if not impossible, to save any money on lighting service without greater losses elsewhere. The best lighting is not costly. For instance, at prevailing rates for power, a store measuring 20 by 60 feet can be quite well lighted six hours a day for less than the wages of a messenger boy or twenty-five per cent of the



The elongated or stalactite type of enclosing unit is employed in this instance. An interesting feature is the fact that two miles of showcases are lighted with individual miniature mirrored glass reflector units in this one store.

salary of one clerk, or for less than half the cost of sweeping the floor and keeping the basement tidy.

If you provide good lighting of the right quality you will materially reduce the return of goods. If the customer does not see the merchandise clearly when purchasing, it is very apt to be returned with the statement, "It is not what I thought it was." There is a case on record of a dress which first sold for two hundred and fifty dollars in a store in a mid-west city, and after many returns finally sold for twenty-five dollars, at which time it was almost worn out after having been sold, packed, delivered and then called for and returned to stock exactly sixty-five times. The actual loss on such

a transaction as this would have paid for good lighting for a long, long period.

If proper lighting speeds the time required for the customer to make a selection, either a given sales force can attend to more customers during the day, or a reduced number of clerks can handle the same amount of business. All these factors must be given consideration when viewing lighting costs.

There are many methods of illuminating an interior, most of which can be used for a store. Some are especially well suited; others not so well. This bulletin presents a more or less critical study of the situation from a semi-engineering viewpoint, and gives facts so that the merchant can form his own opinions as to what is most suitable for his particular establishment.

Classification of Stores as to Lighting Requirements

There are three separate types of stores: the large dry goods and department store, the distinctive shop, and the typical neighborhood or small store such as found in every community. Due to various factors and economic considerations, each of these types has different lighting requirements.

The department store has huge floor areas to be illuminated, and must have a lighting system of relatively high efficiency, yet dignified and appropriate. In other words, the cost of operation of some purely decorative scheme of lighting would make it prohibitive.

The distinctive shop is handsomely finished, located in an exclusive section of town, and is willing to expend any reasonable amount for lighting in order to obtain some desired effect. In other words, efficiency of lighting utilization as such is a secondary consideration, and a very ornamental system with rather high power requirements is perfectly feasible, provided it produces the desired striking artistic effect.

The neighborhood shop, or small store, likewise has requirements peculiar to itself. The capital invested is relatively low, and a large expenditure for elaborate fixtures would be injudicious. Surroundings are usually simple, and ornate lighting equipment would be inappropriate. The store is often kept open for a rather long period to make a few low-value sales. The profit per individual sale is relatively low, and the cost of lighting must be kept at a minimum. In other words, the desired intensity and quality of light must be obtained in an efficient manner.

General Considerations Applying to Store Lighting

First: The store should not be under-illuminated, thus presenting a gloomy appearance. Good store lighting does not mean the supplying of a certain level of illumination on the counters, but rather flooding the whole interior with light. Otherwise, in many cases, the displays are well lighted from the standpoint of



Night view of the main floor of a prominent department store lighted by an ornamental type of enclosing unit. The glassware employed is designed to modify the light in the direction of daylight. 750-watt MAZDA C lamps are used in each bay on approximately 22 foot centers.

enough light actually reaching them, and yet the store may be disagreeable and uninviting.

Second: To make the store pleasant, lamps must be properly placed and so shielded that they are not glaring.

Third: The lighting equipment must be artistic and well arranged so that it will produce a pleasing appearance without drawing one's attention away from the merchandise.

It is quite evident that there is a certain desirable range of illumination to display properly different kinds of goods. From

visual considerations alone, a book department should have more light than a white goods display, a shoe shop requires more than does a furniture department, and so on. Where goods of different character are on display in the same department, it is necessary to supply sufficient light for those most difficult to illuminate. Tables have been worked out by competent engineers for the convenience of those who care to use them, giving the desirable quantity of light for the different departments.

In spite of these considerations there is the more practical one of the drawing power of high level illumination.

We may know that to display china to advantage we should supply 8 foot-candles of light, yet experience has shown that more people are brought into the store if 15 foot-candles or more are provided.

It is evident that one would be foolish to adhere to the lower figure and not take advantage of the well established advertising value of light.

The first floor of a store should always be more brightly lighted than the upper floors, because one enters from the street and, unless a reasonable level of illumination is provided, the interior appears abnormally dark by contrast.

The demands of the store as to color of light are discussed in considerable detail in Bulletin LD-104B, "Artificial Daylight for Merchandising and Industry," and need not be repeated here. While MAZDA Daylight lamps are used in many instances for general illumination and offer many advantages, the most generally accepted practice is to use the warm, unmodified light of the MAZDA C lamp for this purpose. At what might be called strategic points, such as ribbon counters, triplicate mirrors in the clothing department, piece goods department, etc., are located accurate color identification units. This arrangement provides a pleasing appearance in the store proper, permits accuracy in selection of material, resulting in satisfied customers, and causes a remarkable saving of time, which would otherwise be lost in carrying merchandise to a window or doorway for inspection.

The advantage of light colored surroundings in reflecting and diffusing the light and in making the store appear bright is recognized by most store managers, and pure white side walls, columns, and ceilings are the rule. Dark room finishes are indeed rare, which is fortunate from a lighting standpoint.

Inasmuch as the store is constantly under the surveillance of a rather critical public, cleanliness is quite general and lighting equipment is better maintained in the large store than in almost any other class of service. This also is well, for dirt on lighting equipment very appreciably reduces the light output.

Lamps, reflectors, and other accessories should be carefully cleaned at regular intervals. (See Bulletin LD-101B, "Effect of Maintenance and Color of Surroundings on Resultant Illumination.") Such service improves the appearance of the installation and keeps the illuminating efficiency at its maximum value. The cost of cleaning is a very small item in the operating cost. The proper periods between cleanings vary, depending on the atmospheric conditions of the city in which the store is located.

In discussing any class of lighting where individuality plays such a large part as in the store, it is impossible to give definite specifications for all installations. It has been necessary to treat the general subject and to discuss the systems applicable for use with particular reference to the problem in hand.

Illustrations scattered through the text picture the application of the various styles of reflecting and diffusing devices mentioned in the discussion. A general idea of the illuminating qualities of these can be obtained. It is well to sum up a few of the points which must be borne in mind in lighting the department store.

One type of unit should be used for an entire floor, except where there are departments which require special lighting, such as the rug rack, cut glass, art display, and the like. Do not have a mixture of all sorts of fixtures in one open space.

It is desirable to space outlets symmetrically in respect to the bays and columns. Many stores which are otherwise pleasingly arranged have lamps spaced without any regard for uniformity. All lamps on a floor should be hung at the same height. If this rule is not obeyed, the store has the appearance of distorted perspective.

The multiple unit fixture, or chandelier, for direct lighting is no longer generally used in store lighting. There is no necessity for grouping several lamps to get sufficient light, for such a wide range of sizes is available that a standard lamp giving within a few per cent of the desired output of light can be secured.

LARGE DRY GOODS AND DEPARTMENT STORES

Choice of Reflecting or Diffusing Equipment

As everyone knows, the eye should not be exposed to the unshielded lamp filament, as this is of too great brilliancy, producing discomfort and reducing the ability to see. We therefore always equip the light source with some sort of a diffusing device, or use



Night view of the very attractive first floor of a large department store, lighted by 500-watt MAZDA C lamps in color modifying semi-indirect bowls. One outlet is provided for each 20-foot bay. The walls and ceiling are of travertine; the show cases lighted with tubular lamps to an intensity of from 15 to 20 foot-candles.

a reflector. A reflector, besides reducing the brilliancy of a source, has a further advantage in redirecting the light.

There are a great many varieties from which to make a selection, and it is obviously impossible to analyze each type, so merely the various classes will be discussed with particular attention to their suitability for the department store.

The engineering features of specific types of reflectors are treated in detail in Bulletin LD-123B, "Reflectors for Incandescent Lamps."

We cannot look at the question of lighting the store as merely supplying a certain predetermined amount of light on the counters. If this were the object, the most economical method would be to locate a series of projectors close to the ceiling and send strong beams of light downward, but it is obvious that this scheme would make the store appear very unattractive, and shadows would be strong and harsh. Instead of having one plane, such as the counter,



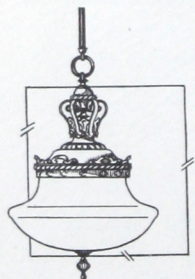
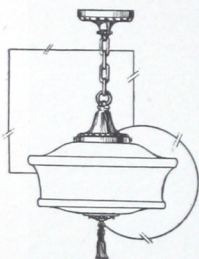
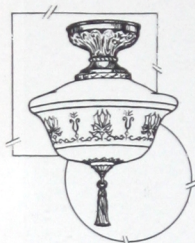
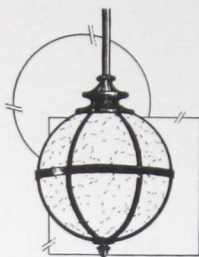
A large glassware and china department well illuminated without the use of ceiling fixtures. On the various tables are placed stand or portable lamps with indirect reflectors surrounded by neat parchment shades. Some light is allowed to escape directly to the table but most of the illumination is indirect. The ceiling fixtures are not now used.

to illuminate, the whole interior of the store must be lighted and the flux of light spread in all directions. From this we gather that, while from a standpoint of lighting the counters efficiently, the enclosing globes, or semi-direct units, are not to be compared with some other units, yet they are very often admirable for giving the soft flood of light in all directions necessary for the high-class store.

Direct Lighting Equipment

Opalescent Enclosing Globes

If the proper glass is chosen, opalescent enclosing globes conceal the light source from view, and diffuse the light so that the entire surface of the ball is equally bright. This should, of course, be done with minimum absorption. Individual makes and varieties of glass are quite different in this respect, and, in choosing equipment, specifications of diffusion and loss of light should be adhered to. (There are a great variety of standard shapes and designs.)



Spherical enclosing globes do not materially change the distribution of light from that of the lamp itself, as light is sent almost equally in all directions. This is not so serious as it might appear at first thought, for the light which strikes the light colored ceiling is largely reflected downward; that going to the side is useful in illuminating vertical surfaces and giving an appearance of cheerfulness and brightness to the store.

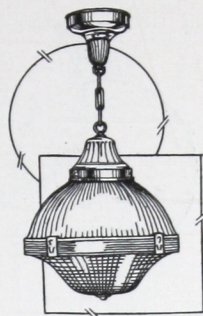
Flattened or shallow opal glass enclosing globes, which tend to send the maximum light up and down rather than to the sides, are now available. These naturally have this feature of more efficient lighting in their favor and find a wide application.

The globes of the elongated or so called "stalactite" shapes send more light to the sides than up and down.

Some of the enclosing units which are very popular have incorporated in them layers of crystal, white, and blue glass. The latter, through selective absorption, modifies the light so that the globe appears whiter and the general character of the illumination tends more toward that of natural light.

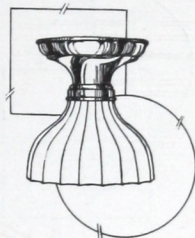
Prismatic Enclosing Units

The type of equipment known as the reflector-refractor, employing the prismatic principle, has the efficiency of utilization of the best open reflectors and the advantages of enclosing units, such as relatively low brightness. These units are very useful where operating costs must be kept especially low.



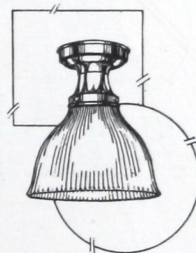
Deep Bowl Reflectors

The heavy density opal and the prismatic varieties of deep bowl reflectors direct the light quite strongly into the lower hemisphere, while the light density opal directs a much smaller amount, transmitting a large part through the glass upward to the ceiling and to the side walls, making the store appear brighter. This last is thought by many to be a desirable condition.



With any type of open mouth reflector, prismatic or opalescent, the exposed portion of the lamp should be of a diffusing character. The white bowl MAZDA C lamp falls in this category.

The shallow bowl or flat opal reflector is sometimes employed for store lighting. This practice has little to recommend it, for a large portion of the lamp is visible and a glaring installation is very likely to result.

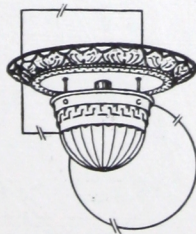


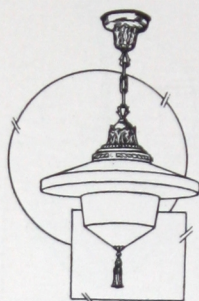
At best, open bowl reflectors are not decorative, and have been largely superseded by other types.

Semi-enclosing Units

A number of patented designs of reflectors fall in the class of semi-enclosing units, which in general consist of a lower diffusing member and an upper reflecting device. Some are one piece, others open. The upper reflector is opaque in certain types and translucent in others.

As a class, they give the same order of diffusion as the enclosing globe, with more directional effect. The same precautions as to adequate size must be observed. The open units are susceptible



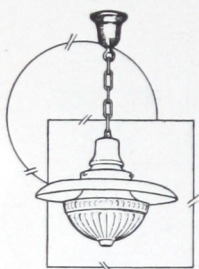


to dust collection, and those with an opaque top are likely to cast a dense objectionable shadow on the ceiling, if care is not taken to insure proper spacing and hanging height.

Semi-enclosing units are obviously of particular service when surroundings are dark but, as mentioned above, under ordinary conditions the simple type of opalescent enclosing unit is in general more practical.

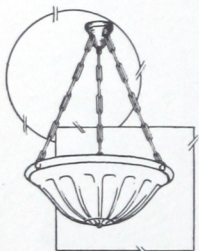
Indirect Equipment

For the indirect systems the ceiling and walls must be light in color if the light is to be effective. Since the ceiling is the most brightly illuminated part of the structure and considerable light also is thrown towards the side walls, the room appears bright—a desirable condition. Of course, for equal illumination on the counters somewhat more power must be used than that required for direct lighting.



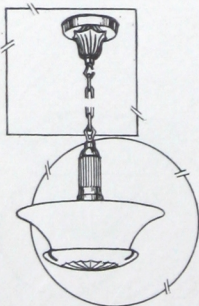
Open Type Semi-indirect, Opalescent Bowls

The standard shapes, sizes, and decorations of these opalescent bowls are almost without number. Many are tinted and otherwise decorated. Some progressive stores have a design made especially for themselves, with a monogram or special feature etched or pressed into the structure of the dish.



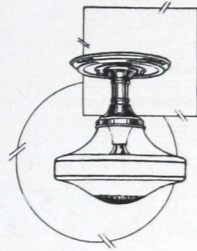
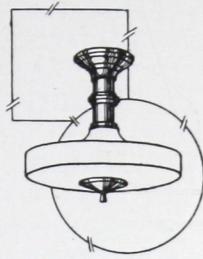
Open Type Semi-indirect, Metal and Glass

A form of equipment which has a wide application consists of an inverted porcelain enameled reflector with an opening in the bottom covered by a diffusing glass plate. With the proper curvature of the reflector and the plate in the correct relation to it, a wide distribution of light is secured and the exterior of the opaque reflector is slightly illuminated. These devices give a soft, pleasing quality of illumination and are susceptible of a wide variety of treatment, with various ornamental accessories, such as silk, cretonne, and parchment shades, cast metal ornaments, and silk diffusing screens.

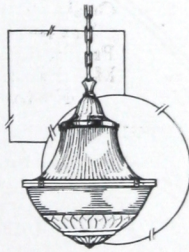


Enclosing Semi-indirect, Opalescent

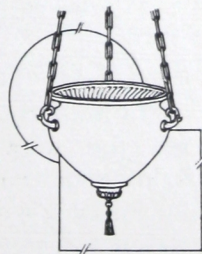
While any lighting unit must be regularly cleaned if it is to continue effective, nevertheless inverted bowls are inherently susceptible to the collection of dust and other foreign material. This makes the depreciation of light somewhat more rapid and requires a shorter period between cleanings. To overcome this difficulty there have been developed one-piece glass semi-indirect enclosing units. The bottom and sides are dense white, giving the necessary directive and diffusive effect, and the upper half is of clear glass. This is designed to have minimum absorption, and is so sloped as to reduce the accumulation of dust as much as possible. The light-emitting properties and quality of illumination produced are identical with the opalescent bowls previously discussed. It is apparent that this type of fixture has qualities which strongly recommend it from an operating standpoint.

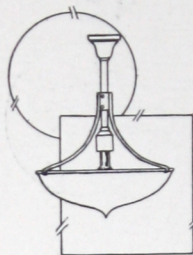
*Enclosing Semi-indirect, Prismatic*

Advantage is taken of the light-controlling property of prismatic glass to produce a fixture which is efficient in directing the light to the ceiling and which at the same time has a very low exterior brightness. Decorative fabric shields can be used to tone the transmitted light and ornament the bowl. Excellent artistic effects can be secured with practically no sacrifice in light.

*Totally Indirect*

There are two main types of totally indirect units: one employs mirrored glass bowl-shaped reflectors inverted within decorative housings; the other (see illustration, page 18) utilizes a shallow porcelain enameled steel reflector in the same manner. The mirrored type is slightly more efficient, while the enameled variety is less expensive. Many styles of housings are available and these are finished in any tint suited to the particular





interior in which they are to be installed. The illumination from the totally indirect system is very well diffused and no light source is visible. These factors cause the store lighted by these units to be most comfortable, and the working conditions pleasant.

To prevent the opaque fixture from appearing as a dark spot against the illuminated ceiling, a form of unit known as a luminous bowl indirect is employed. Mirrored inverted reflectors are used, but a small amount of light is allowed to escape and illuminate the glass bowl which conceals the reflecting equipment.

Summary

Attempt has been made below to classify the various types of reflecting and diffusing devices suitable for use in the store, in the order of their effectiveness in certain directions. This summary is based on the average high-grade store finish of pure white and is not absolute; as, for example, some dense opalescent enclosing globes may be less efficient than a semi-indirect unit in a room with a light ceiling.

BRIGHT-APPEARING STORE

- Opalescent enclosing globes
- Glass semi-indirect
- Prismatic enclosing units
- Metal and glass semi-indirect
- Totally indirect

DIFFUSION OR SOFTNESS OF ILLUMINATION

- Totally indirect
- Semi-indirect
- Opalescent enclosing globes
- Prismatic enclosing units

MAXIMUM LIGHT ON THE COUNTERS FOR A GIVEN AMOUNT OF POWER

- Prismatic enclosing units
- Opalescent enclosing globes (quite dependent on the kind of glass used)
- Semi-indirect
- Totally indirect.

Size of Lamps, Spacing of Outlets, and Mounting Height

In the early days, when only inefficient lamps without effective reflectors were available, it was sometimes necessary to place lighting units close to the counter in order to obtain sufficient illumination without undue expense. Needless to say, this scheme was not conducive to attractive stores. Now general lighting is

universally used. Lamps are arranged symmetrically with regard to the bays or pillars, and the whole floor is uniformly lighted. It is not necessary to take into consideration the position of the counters when spacing the lamps, for a sufficiently high intensity is provided everywhere for one to examine carefully the goods on display. If the rules for spacing outlets are observed, there need be no fear of objectionable shadows in any part of the building.



Night view of a ladies' ready-to-wear department, illuminated by one 24-inch opalescent glass semi-indirect bowl containing three 100-watt *MAZDA C* lamps in each bay.

The large store is usually divided by supporting columns into bays, the average dimensions of which are 22 by 22 feet. The ceiling height in most stores is such as to permit satisfactory illumination with one outlet per bay on the first floor, while the upper floors are lower and usually require two or four outlets, symmetrically arranged, in each section.

As a general rule, it is never advisable to place lamps farther apart than the ceiling height.

There are advantages on both sides of the question of the number of outlets per bay. Using a few outlets keeps the cost of wiring

at a minimum and permits the economical use of the larger, more efficient lamps. On the other hand, with the smaller lamps the light at any one point is received from a greater number of sources; hence the possibility of shadows is lessened, and the failure of one unit does not put a section in darkness.

The wide and consistent range of sizes of MAZDA lamps makes them especially well adapted to just such conditions.

On the main floor of a store with bays 22 by 22 feet, the following combinations might apply:

One outlet—One 750 or 1000-watt MAZDA C lamp.

Two outlets—Two 500-watt MAZDA C lamps.

Four outlets—Four 200 or 300-watt MAZDA C lamps.

The large number of sizes of standard MAZDA lamps makes store lighting a most flexible proposition. Suppose a certain type of fixture is adopted for an entire floor (this is, of course, a desirable condition) and four outlets per bay are installed. Where the maximum light is needed, say in the fur department, 300-watt MAZDA C lamps might be used; if the notions department were on the same floor, then 200-watt MAZDA C lamps on the same spacing would give sufficient light, while in the furniture department as low as the 100-watt size would serve. This assumes, of course, that the store is so arranged that the variation in illumination does not produce an inartistic effect.

It is always desirable to place lamps as high as possible to keep the light sources out of the line of vision, but this should not be carried to an extreme so that a distorted appearance results.

This entire subject of determining the size of lamp to use is covered in Bulletin LD-117C, "Calculation of the Lighting Installation." Knowing the foot-candle illumination desired, the type of unit, color of walls and ceiling, dimensions of the room, etc., the calculation is a relatively simple matter.

Special Considerations in Department Store Lighting

Up to this point the discussion has been devoted entirely to a general consideration of the lighting of the store. The uses of electricity in the form of light and power in and about the store are so numerous that it is impracticable to go into detail. For example, the strident voice of the sales girl calling the floorwalker is now replaced by the silent signal light operated by the mere pushing of a button; miniature electric signs direct the customer to the particular department he is seeking; by the aid of electric

light, show cases are made to stand out and display their goods as miniature show windows. There are certain portions of the store which demand special treatment. These are outlined below in brief.

Cut-glass and Jewelry Departments

If the light is too diffused, much of the desirable sparkle and life of the merchandise is lost. Direct lighting with clear lamps produces the best effects. Crystal chandeliers are often in good taste. The quality of light produced by the MAZDA Daylight lamp is pronounced by experts as advantageous for the examining and displaying of precious stones.

Art Department

Special lighting arrangements are quite essential to provide even illumination over the entire wall surface. (See Bulletin LD-135B.) Properly designed mirrored reflectors have proved most satisfactory for this purpose. The fixtures should be neat, and finished to match the general decoration of the room, and the lamps should be entirely concealed from view in order that the pictures may be examined with comfort. The general lighting should be of a low intensity and so placed as to have no distracting influence.

Furniture Department

As mentioned, only a moderate intensity of illumination is required in the furniture department to display the merchandise to the best advantage. It is desirable that furniture be purchased under conditions similar to those which exist in the home, where it will be used.

Modified light of a reddish yellow tone is often a desirable feature here, giving the impression of warmth. Decorative types of general lighting fixtures are of service and silk shaded portable table or floor lamps, served from convenience outlets, add to the homelike appearance.

The recently introduced practice of fitting up small specimen rooms with the furniture on display has much to commend it from a merchandising standpoint. Frequently, however, no thought is given to the illumination of these sections and the standard commercial or store lighting unit is applied. In the home the endeavor is made to have the lighting fixtures harmonize with the period of the room decoration. The large store should therefore

have available sets of pleasing and appropriate fixtures; then, as these displays are changed, suitable lighting for the dining room, bed room, or living room may also be provided. The use of a fitting known as the *elexit*, which enables one to "hang a fixture like a picture" to the ceiling or side wall, is a decided asset here.



Night view of the furniture department in one of the most progressive stores of the country. Very comfortable, soft illumination is provided by 100-watt MAZDA C lamps in metal and glass semi-indirect fixtures, four per bay. An orange red silk shade surrounds the reflector and produces a warm homelike effect.

Ladies' Waiting Rooms

A low intensity of soft, well diffused illumination is desirable here so that the fatigued shopper may rest in comfort. The artistic features predominate in the choice of lighting equipment. Methods which are used in the home are applicable. The free use of portable or floor lamps with silk and other decorative shades adds to the coziness of the atmosphere.

Stairs and Elevators

It is necessary that stairs and elevators be particularly well illuminated to obviate the possibility of accidents. Proper atten-

tion should be paid to the equipment on lamps near the stairway. If a reflector is missing and the bright filament of a bare lamp is in the field of view, one is likely to be temporarily blinded, to stumble, and fall. In such an event, the management might be judged guilty of neglect.

The general illumination will, in most cases, provide sufficient light for the stairways, but, if they are located so that they are in



One would be attracted to this men's and women's clothing store by the fairly high level (10 to 12 foot-candles) of well-diffused lighting. The illumination is provided by ten 200-watt clear MAZDA C lamps in opalescent enclosing globes on twelve-foot centers. This is also a Type C layout.

partial shadow, it is necessary to use wall or ceiling outlets with medium size lamps. These can be equipped with reflectors harmonizing with the unit adopted for general illumination. In the case of enclosed stairways an outlet should be provided at each landing. It is well to have emergency lighting circuits provided for the stairs and main exits.

The elevators should have sufficient light effective on the floor so that passengers will be able readily to see its position when entering or leaving.

The modern types of elevators are in general equipped by the maker with special devices for illuminating the front edge of the car.

Cashier's Department, Offices, and Service Rooms

In the former, the money drawers and tables must be illuminated to a high intensity to insure speed and accuracy in change making, with a minimum amount of eye fatigue. The lighting of the offices should receive careful attention, for it is most important to protect the eyesight of those devoting their time to clerical work and accounting. The data on bank lighting given in Bulletin LD-135B, "The Lighting of Public Buildings," can be applied directly to the cashier's department, while the office illumination can be planned in accordance with the rules laid down in Bulletin LD-108B, "The Lighting of Offices and Drafting Rooms."

In most instances but little attention is paid to shipping and service rooms, and drop lights with inefficient lamps and poor reflectors are scattered about haphazardly. It is real economy to install a modern system of general illumination, employing R.L.M. Standard dome reflectors and white bowl MAZDA C lamps.

Building Exterior and Entrance

One's first impressions are always very strong, and if the entrance and exterior of a building possess drawing power a decided psychological advantage is obtained. The main entrance or lobby is often elaborately decorated, and its lighting should be designed so that the architectural beauty is supplemented. An ornate and novel design of fixtures and glassware is often quite important.

Floodlighting the exterior of buildings has become quite prevalent in the last few years, and many well known stores have properly designed floodlighting which illuminates the entire exterior of the building to the proper intensity, causing it to stand out against the dark background formed by the sky. Floodlighting with incandescent lamps is very practical, and is now almost the universal method.

DISTINCTIVE SHOPS

General Principles of Designing the Lighting of Shops

The high grade shop should obviously receive quite different lighting treatment from the neighborhood or ordinary small store. It should have an individual touch and, as far as possible, illumi-

*Upper*

General illumination is provided in this beauty parlor by diffusing enclosing units. Each manicure table has an individual adjustable local light.

Lower

A totally indirect system furnishes soft well diffused lighting for this rest room in a large middle-west department store. 150-watt MAZDA C lamps in mirrored glass inverted reflectors within a very simple housing are used. A few portable lamps give a touch of color and a restful homelike atmosphere.

nation adapted to its particular line of business. Such shops are as a rule small, handsomely and lavishly furnished, splendidly finished to the minutest detail, located in the most fashionable sections of town, handle only the best grades of goods, and sell

to a discriminating class of customers. The proprietor or manager should be, and is, willing to spend large sums for the correct equipment and for its operation. The profits per individual piece of merchandise sold are undoubtedly greater than in other stores and more money can be spent in providing the desired setting. Artistic appearance is the predominant factor. A distinctive system



In this shop devoted to furs of the most exclusive variety, the effect of the crystal chandelier installation is obtained without its inherent disadvantages.

Within the body of the fixture are a number of mirrored glass reflectors producing indirect lighting. A few lower wattage lamps serve to light the crystals, and yet these furnish very little illumination. Indirect units in urns at the tops of columns can be noted in the rear, as well as a number of well chosen table lamps used primarily for decoration.

of lighting is necessary and, in general, efficiency in terms of utilization is a decidedly secondary consideration.

Some definite architectural scheme should be carried out or some form of symbolism expressed. Many shops show such an influence by having the sales force dressed in harmony with a certain predetermined plan. Certainly the lighting system is a very important feature.

Among the points which should be given consideration when planning a distinctive store may be mentioned the following:

Design of the exterior

Woodwork of the interior

Decorations of walls and ceiling

Finish of showcases and tables

Floor coverings and hangings

Type and design of lighting fixtures,
glassware, and lamps.



Utilitarian fixtures would be quite out of place in this exclusive millinery shop, which is, in general, Italian in feeling. Multiple units of the wrought metal candle type are used. It is noted that on both the ceiling and wall fixtures all lamps are hidden by well chosen parchment shades.

As far as possible, the general requirements of good lighting set forth in the introductory paragraphs should be adhered to. The shop should never be made uncomfortable through the presence of brilliant, glaring light sources. On the other hand, in this type of store it is often expedient and desirable to provide lower values of illumination than have been found in other places most suitable, either from the standpoint of displaying the goods to advantage or from a consideration of the drawing power of light. So-called

"atmosphere" is often essential, and too high a level of illumination may destroy the very effect sought. Each problem must be analyzed individually, and it is quite impossible to set down any definite rules for this class of lighting. In fact, individuality should be the keynote; any attempt at monotonous standardization is to be deplored.

Numerous examples of distinctive store lighting have undoubtedly come to the attention of everyone, and important factors in planning such lighting are imagination and experience. Imagination—in order that one may visualize the result and co-ordinate this with the purpose of the installation; and experience—that one may recall somewhat similar conditions that have been well met in actual installations and then modify such schemes to fit the particular case in hand.

The only feasible way of discussing the problem here is to deal in generalities and then to illustrate these principles as far as space will permit, supplementing this by concrete examples of the method of thought which should be followed in some hypothetical instances. It is quite impossible to tabulate even a very small portion of the correct schemes of lighting to use. Often in designing an installation the ideas or desires of the proprietor will produce considerable deviation from the scheme which would be most in keeping with the period of architecture that is being followed.

There is a large field in this class of lighting for special equipment, although one can often apply commercial diffusing and reflecting devices, with slight modifications, to the most distinctive installation. In general, utilitarian fixtures are quite out of the question. All the illuminating equipment, rather than being dazzling, glaring, or commonplace, should be inconspicuous and form a part of the furnishings of the room. Fixtures and surrounding decorations should be planned and built up simultaneously with the co-operation of the lighting engineer and the architect or interior decorator. The lighting engineer should, if possible, be in on the proposition at its conception, for sometimes slight modifications in the structural details may be necessary.

There are many types of glass appliances on the market especially well suited for distinctive lighting effects, and one should be thoroughly familiar with what is available and save the expense of peculiar and special designs of glassware. Different manufacturers list equipment in the period designs: Gothic, Doric, Adam, Georgian, Colonial, etc. Diffusing glass is available in the forms of

cylinders, columns with bases and capitols, troughs for outline and cornice lighting, flat or figured plates for ceiling panels, and plaques for side walls.

Such glass can be painted or cleverly decorated to bring out relief designs, or can have incorporated in it special monograms, etc., which feature trade designs. The finish of the fixture can be matched with properly colored glassware. It is often possible to



In this shop devoted to Oriental rugs and furniture specialties, the standard type of metal and glass semi-indirect unit has been transformed so that it has a most ornamental appearance. A cast metal decoration is applied with the openings covered with diffusing glass. 300-watt MAZDA C lamps are used. Outlets are spaced on 10-foot centers. This illustrates very well how standard equipment can be modified so that it is suitable for a specialty shop.

use standard types of lighting units, and, by the addition of special accessories, such as cast metal rings, unique holders, and applied ornaments, make them appear quite decorative and attractive. Colored and tinted lighting has considerable application in the distinctive shop.

It is not necessary to employ ordinary pendent ceiling fixtures or standard types of wall brackets. With forethought, general

illumination can be secured with lamps above diffusing ceilings, behind plates recessed in the side walls, behind curved sections at the juncture of ceiling and walls, from indirect table and floor lamps, from the tops of high show and wall cases, and from ornamental pedestals or urns. In fact, with modern methods of applying light there is literally no limit to its possibilities.



This attractive shoe shop, one of a large chain, is well lighted without the use of ceiling fixtures. Indirect floor lamps are placed between the rows of chairs. The light from MAZDA lamps is sent to the white ceiling, from which it is reflected downward. The rather severe parchment shade is very uniquely decorated by silhouettes in the "John Held" style showing the modern family admiring their new foot-wear.

Examples of Application of These Principles

To illustrate some of the possibilities let us consider a few typical cases and note some of the features to be observed.

Toy Shop

We must make the interior attractive to the little ones, and lighting can be a decided factor in attaining this end. Let us therefore install, in accord with the rules for spacing and mounting, simple types of diffusing enclosing globes with an adequate size

of lamp. Around each globe suspend a framework in the shape of a feudal castle made of art glass or translucent fabric, colored and painted to suit the structural features. Instead of ordinary wall brackets let us recess lamps in the walls and cover the circular or oval opening with flat plates decorated in color with nursery rhyme characters, Puss-in-Boots, Jack and the Bean Stalk, etc. Light is diffused through these and the whole room has attractive, unusual charm and drawing power.



In this dry goods establishment the Georgian decorations have been emphasized through the use of a novel and rather severe design of diffusing enclosing units. Here, also, standard equipment would hardly have been in good taste. 500-watt MAZDA lamps are used and outlets are on centers 16 by 19 ft.

Jewelry Shop

Richness and splendor are symbolized by jewels and the shop dealing in these should be magnificently finished. Direct lighting is quite essential in order that the sparkle and brilliancy of the display may be brought out. Crystal fixtures of some sort are rather desirable, but it is not necessary to employ the standard type which creates considerable glare by permitting much of the flux to go directly to the eye. It is possible to design these fixtures so that

strongly concentrated reflectors are concealed in the body, sending the light down on the counters and allowing only a portion to come toward the eye.

Tea Room

Coziness is the keynote of success of these establishments, and the methods of lighting used in the home apply here. We can



In this pleasing, distinctive jewelry shop the desirable qualities of direct lighting, combined with adequate eye protection, are obtained through the use of prismatic reflector-refractor units. A standard type of equipment is employed, but this is so embellished through the addition of an ornamental hanger, a decorative tassel at the bottom, and an ornamental metal framework that its entire appearance is quite changed. There is a uniform distribution of high level lighting.

picture a shop modeled after a New England interior of fifty years ago, with the ceiling low and finished in white plaster. The floor of wide boards painted a dark yellow and covered here and there with rag carpet "runners." The old-fashioned fireplace and a number of stalls similar to those found in taverns of bygone days. One should carry out the lighting which was undoubtedly employed in such an interior, although using present day light sources. From the ceiling one or two "hanging lamps" picked up in some second-hand shop, fitted with electric sockets and flame-tint lamps,

the light from these very closely resembling that of the old kerosene burner. In the fireplace an imitation electric grate with its hot coals and flickering shadows. On each table a standing lamp with the flame-tint lamp and old-fashioned fabric shades.

Imported Antiques

Naturally the lighting requirements of such a shop are similar to those of a high-class furniture store, with a low intensity of diffused illumination. Exposed light sources would be very objectionable as polished surfaces show reflections. The lighting units themselves should be rich and, if possible, have an antique appearance. Nothing seems much better suited than hand carved semi-indirect alabaster bowls, for their streaked and mottled appearance gives the impression of rich, yet dignified, age.

Ladies' Evening Wear

One always associates the sparkle of the crystal chandelier with the festivity of the evening party, and the room designed in pure Louis XV is enriched through the use of crystal chandeliers and side wall brackets. We must remember, however, that our smallest present day lamps are ten or more times more powerful than the old candle, and therefore take precautions to supply suitable silk shades and shields to reduce the brilliancy.

NEIGHBORHOOD OR SMALL STORES

Choice of the Lighting Unit

As was pointed out in the introductory paragraphs, adequate lighting must be obtained in the average small store in an economic manner and the lighting unit must fulfill several requirements:

1. It must have a relatively high output to keep the cost of operation as low as possible.



A thoroughly up-to-date barber shop illuminated by fourteen 100-watt MAZDA C lamps in enclosing opalescent semi-indirect units, placed close to the 10-foot ceiling. A good example of the Type C layout.

2. It must not expose the bright filament to view but should rather soften or diffuse the light.

3. It must be low in first cost to prevent the investment charge from being excessive.

4. It must be neat and simple in appearance. There is little requirement of distinctiveness in this class of service and, in general, plain, severe lines are in better taste than ornate decorations.

5. It must not concentrate the light in a narrow angle, but should emit considerable flux to the sides to illuminate the wall shelves.

6. It must not tend to accumulate an excessive amount of dirt.

7. It must be easy to clean.

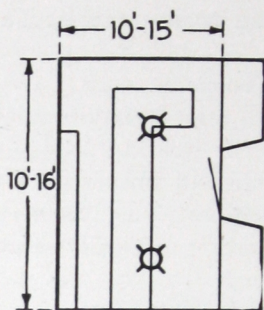
The equipment which most nearly fulfills all these requirements at the present state of the lighting art is an opalescent enclosing globe of suitable contour and proper density, with a neat fitter and simple means of support, such as a chain or cord pendant. Such a fitting has become practically standard for this class of service.



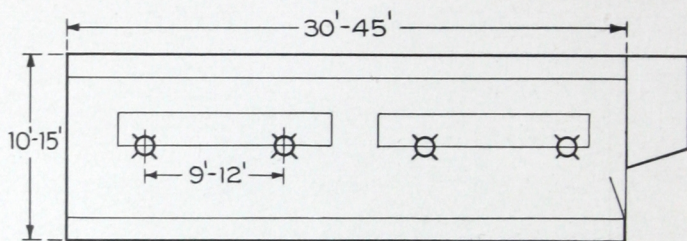
Night view of a typical small haberdashery shop, lighted by three 200-watt MAZDA Daylight lamps in light-directing enclosing globes. An intensity of illumination of approximately ten foot-candles enables one to make critical selection of the merchandise on display.

Size of Lamp, Spacing of Outlets, and Mounting Height

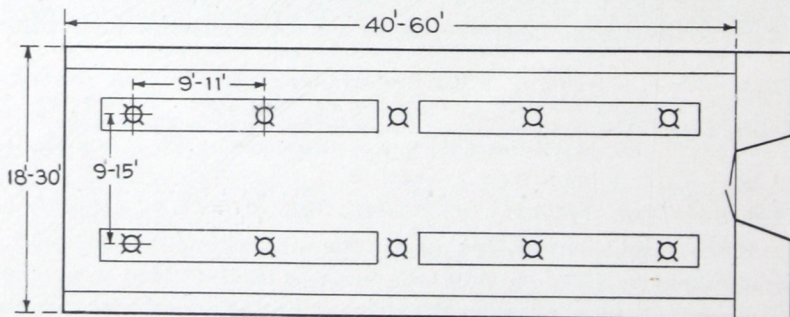
Much might be written as to the desirable illumination for the different types of small stores, such as the fact that it requires less light to display groceries than cigars, but as a matter of fact the advertising and drawing power of a well lighted store is of far more importance than that of furnishing light for special processes, so for purposes of simplicity, we may well consider all types of small



Arrangement of outlets for Type A (small square) store. Two 200-watt MAZDA C lamps in deep bowl direct lighting reflectors if the side walls are dark; in opalescent enclosing units if the side walls are light. If the dimensions are greater than 10 by 15 feet, 300-watt lamps should be provided or four outlets installed with 150 or 200-watt lamps. The relatively high wattage is necessary due to the small dimensions; proportionally more light is absorbed by the side walls.



Arrangement of outlets for Type B (long narrow) store. 200-watt clear MAZDA C lamps in light density opal enclosing globes hung 9 to 12 feet above floor for stores less than 12 feet wide; for widths 12 to 15 feet 300-watt units. As the length of the store in general is from 30 to 45 feet three or four outlets become more or less standard practice.



Arrangement of outlets for Type C (full width) store. 200-watt clear MAZDA C lamps in light density, opal enclosing globes 9 to 12 feet above floor for stores up to 20 feet in width. 300-watt units of the same type for stores from 20 to 30 feet in width.

stores as having similar general lighting requirements. A few exceptions to this will be noted in the discussion of individual classes of stores given in the following pages. On this assumption we may divide the small store into three main groups, depending on their dimensions:

(A) A square room averaging 12 by 12 feet with possible variation from 6 to 18 feet. This type of store is encountered where the living room or work shop of the proprietor is located in the rear, the building being on a standard city lot.

(B) A long, narrow store averaging about 12 feet wide and 40 feet deep. This type of store is produced where the building of standard width is divided into two stores.

(C) The store occupying an entire lot. Average width 20 feet, length approximately 50 feet.

The typical layouts of such stores based on the use of opalescent enclosing units are shown in the accompanying illustrations. There is a tendency on the part of the uninitiated to hang lighting fixtures too low, with the belief that better illumination results will be obtained. This, however, is not the case. Lamps should always be well above the line of view and approximately 9 feet is the lowest that it is desirable to hang units of the sizes specified. With the ceiling heights prevailing in the average store, the lamps in most instances should be 10 or 11 feet high.

If the few very simple rules set forth above are followed, a satisfactory and modern store lighting installation will result.

Hints on Wiring and Lighting Various Classes of Small Stores

Bakeries

In the bakery, convenience outlets for the attachment of electric fans are essential features of the wiring layout.

In most instances, the bake shop adjoins the retail store and the proper illumination of this room must not be overlooked. It has been definitely proved that with proper lighting the output of the industrial plant is increased and sanitation improved. Recognizing the importance of this feature, most cities have ordinances in force relative to the ventilation and lighting of bake shops. The R.L.M. Standard dome reflector and white bowl MAZDA C lamp, or similar efficient equipment, should be installed here. An improved quality of product will be possible if from eight to twelve foot-candles of illumination are provided.

In the modern bake shop the automatic or semi-automatic machines are electrically driven and provision must be made for supplying these with power. Among such devices will be noted the following: apple parer, beater, blender, brake, cake machine, divider, mixer, pie machine, roll cutter, rotary oven, sifter, and sugar pulverizer. The power requirements will obviously depend on the capacity of the machine. Data on these can be obtained from the manufacturers of the apparatus or motors.

Barber Shops

As the patron is required to lie back in the chair for an appreciable time, bright light sources are particularly objectionable. Although the enclosing type of direct lighting unit works out fairly well in practice, a semi-indirect system is preferable, for the brightness of the glassware should be of a low order. This system has additional advantages in the way of diffusion, and reduces shadows which would be objectionable when shaving or cutting the hair. The surroundings in the modern shop are light in color making the conditions favorable for this system.

Convenience outlets should be available at each station to which electric vibrators, hair dryer, water heater, sterilizer, and curling iron heaters can be attached. Another row of outlets is desirable on the opposite wall to supply the electric fans.

Cigar

The surroundings are usually dark and frequently the walls are lined with cases which are of little use in reflecting the light which strikes them. The material on display is dark in color and of a nature that must be examined rather critically. A fairly high intensity of illumination is quite desirable.

MAZDA Daylight lamps are often desirable as they present the merchandise to better advantage, although, where these are used, more power is necessary to produce a given intensity. Convenience outlets for the electric cigar lighter and humidifier are features of the well-equipped shop, and, where it is desired to satisfy the most critical customer, a color matching unit of the accurate type can well be provided on the counter for the examination of the shade of cigars.

Clothing, Dry Goods, Haberdashery, Millinery, and Women's Wear

The more progressive shops provide true daylight color artificial units over the triplicate mirrors in the clothing shop and on the counter in the dry goods store and haberdashery for matching

goods, selecting neckwear, etc. In the millinery establishment, some decorative form of lighting unit over the mirrors at the vanity tables should be given consideration.

Confectionery and Drugs

These shops are somewhat more elaborately decorated than most small stores and an ornamental or decorative type of fixture



A modern drug store as it appears by night, lighted by twelve 200-watt MAZDA C lamps in light-directing enclosing units in three rows. This merchant believes in the drawing power of light, and provides eleven foot-candles of general illumination.

may be more desirable. In many of the shops the rear half is devoted to an ice cream parlor where special lighting effects may well be introduced. To maintain the desired cool atmosphere, electric fans should be provided, and, in addition, convenience outlets at the rear of the soda counter are necessary for the agitator or mixer.

Frequently the candy-making or ice-cream factory adjoins the store. The remarks regarding the bake shop apply to this class of service. The wiring layout should be such as to enable the proprietor to operate electrically such devices as the ice cream freezer, melting and mixing kettles, marshmallow and cream beaters, mixers, choppers, grinders, cutters, and rollers.

Delicatessen, Dairy Products, Grocery, Meat Market

Convenience outlets for supplying the small motors on the coffee grinder, meat slicer, stirrer, or beater, and meat grinder should be installed. The refrigerator can be operated in a most satisfactory manner by electrical means, employing the brine circulating and expansion system.



Night view of a small delicatessen shop, lighted by three 200-watt clear MAZDA C lamps in opalescent enclosing globes. The fixture, neat and inconspicuous, is in keeping with the character of the shop. An intensity of 6-8 foot-candles prevails on the horizontal plane, with slightly less illumination on the shelves.

If the ice box or refrigerator is of large size, it should be furnished with a few low-wattage MAZDA lamps which are controlled from the outside and so wired that a pilot light indicates when they are burning.

Hardware, Paint, Auto Supplies, Electrical Goods

An electrical dealer cannot expect to convince his customers that light is a sales stimulant unless he follows the best practice in his own establishment. A number of convenience outlets or testing sockets should be placed on the counter in such stores to demonstrate the various electrical devices which are being merchandised.

Jewelry and Cut Glass

In stores of this nature, direct lighting is generally desirable. Too great an element of diffusion or softness of light is not well adapted to make the display appear to the best advantage. The merchandise should sparkle by reflecting the light source. MAZDA Daylight lamps have been used in many installations with good



A hardware store lighted by 200-watt MAZDA C lamps in color modifying enclosing globes. A single row of outlets ten feet apart down the center of this store, which is 16 feet wide, illustrates the arrangement for a characteristic Type B store. Special lighting is provided in the show and wall cases.

effect. In wiring jewelry shops, one must not forget to provide convenience outlets for the jeweler's lathe, buffer, and soldering iron.

Restaurants and Lunch Rooms

Outlets for electric fans must be remembered and, where electric cooking is deemed advisable, provision made to have sufficient wiring capacity available for this.

Shoe

If a repair department is part of the establishment, an electric motor will be required for driving the shoe machinery. To facilitate speed and accuracy, plenty of light should be supplied here from standard industrial units.

THE SHOW WINDOW

In the large store, the art of show window lighting has experienced remarkable advances within the last decade. There is still much room for improvement, however, in the lighting of the show window which is part of the typical small store. There is still a tendency to utilize the same type of equipment in the show window as is used for lighting the store proper, the window lighting being virtually a continuation of the store lighting.

It is well established that visible lights in the show window are not desirable. Lamps should be equipped with efficient reflectors and concealed from view. The principles of modern show window lighting are given in detail in Bulletin LD-103C, "Lighting of Show Windows and Show Cases," and need not be repeated here. Suffice it to say, there is no good reason why every merchant cannot make his windows a decided sales asset. Proper lighting will do much toward attaining this end.



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| <p>AKRON, OHIO, 159 South Main St.</p> <p>*ATLANTA, GA., 123 Spring St.</p> <p>BALTIMORE, MD., 39 West Lexington St.</p> <p>BIRMINGHAM, ALA., 602 North 18th St.</p> <p>BLUEFIELD, W. VA., 104 Federal St.</p> <p>*BOSTON, MASS., 84 State St.</p> <p>BUFFALO, N. Y., 39 East Genesee St.</p> <p>*BUTTE, MONT., 40 East Broadway</p> <p>CANTON, OHIO, 700 Tuscarawas St., West</p> <p>CHARLESTON, W. VA., 201 Capitol St.</p> <p>CHARLOTTE, N. C., 200 South Tryon St.</p> <p>CHATTANOOGA, TENN., 536 Market St.</p> <p>*CHICAGO, ILL., 230 South Clark St.</p> <p>*CINCINNATI, OHIO, 215 West Third St.</p> <p>*CLEVELAND, OHIO, 925 Euclid Ave.</p> <p>COLUMBUS, OHIO, 17 South High St.</p> <p>*DALLAS, TEXAS, 1801 North Lamar St.</p> <p>DAVENPORT, IOWA, 111 E. Third St.</p> <p>DAYTON, OHIO, 25 North Main St.</p> <p>*DENVER, COLO., 650 17th St.</p> <p>DES MOINES, IOWA, 418 West 6th Ave.</p> <p>*DETROIT, MICH., 700 Antoinette St.</p> <p>DULUTH, MINN., 14 West Superior St.</p> <p>ELMIRA, N. Y., 342 East Water St.</p> <p>*EL PASO, TEXAS, 109 North Oregon St.</p> <p>ERIE, PA., 10 East 12th St.</p> <p>FT. WAYNE, IND., 1635 Broadway</p> <p>GRAND RAPIDS, MICH., 201 Monroe Ave.</p> <p>HARTFORD, CONN., 18 Asylum St.</p> <p>*HOUSTON, TEXAS, 1016 Walker Ave.</p> <p>INDIANAPOLIS, IND., 106 North Illinois St.</p> <p>JACKSON, MICH., 308 Francis St.</p> <p>JACKSONVILLE, FLA., 11 East Forsyth St.</p> <p>*KANSAS CITY, MO., 1004 Baltimore Ave.</p> <p>KNOXVILLE, TENN., 602 South Gay St.</p> <p>LITTLE ROCK, ARK., 223 West Second St.</p> <p>*LOS ANGELES, CAL., 5201 Sante Fe Avenue</p> <p>LOUISVILLE, KY., 455 South Fourth St.</p> | <p>MEMPHIS, TENN., 130 Madison Ave.</p> <p>MILWAUKEE, WIS., 425 East Water St.</p> <p>*MINNEAPOLIS, MINN., 107 Fifth St., South</p> <p>NASHVILLE, TENN., 234 Third Ave., North</p> <p>NEWARK, N. J., 20 Washington Place</p> <p>NEW HAVEN, CONN., 129 Church St.</p> <p>*NEW ORLEANS, LA., 837 Gravier St.</p> <p>*NEW YORK, N. Y., 120 Broadway</p> <p>NIAGARA FALLS, N. Y., 201 Falls St.</p> <p>*OKLAHOMA CITY, OKLA., 15 No. Robinson St.</p> <p>OMAHA, NEB., 409 South 17th St.</p> <p>*PHILADELPHIA, PA., 1321 Walnut St.</p> <p>PHOENIX, ARIZ., 11 West Jefferson St.</p> <p>*PITTSBURGH, PA., 535 Smithfield St.</p> <p>*PORTLAND, ORE., 329 Alder St.</p> <p>PROVIDENCE, R. I., 76 Westminster St.</p> <p>RICHMOND, VA., 700 East Franklia St.</p> <p>ROCHESTER, N. Y., 89 East Ave.</p> <p>*ST. LOUIS, MO., 112 North Fourth St.</p> <p>*SALT LAKE CITY, UTAH, 200 So. Main St.</p> <p>*SAN ANTONIO, TEXAS, 601 Navarro St.</p> <p>*SAN FRANCISCO, CAL., 116 New Montgomery St.</p> <p>SCHENECTADY, N. Y., 1 River Road</p> <p>*SEATTLE, WASH., 811 First Ave.</p> <p>SPOKANE, WASH., 423 Riverside Ave.</p> <p>SPRINGFIELD, MASS., 1387 Main St.</p> <p>SYRACUSE, N. Y., 113 South Salina St.</p> <p>TACOMA, WASH., 950 Pacific Ave.</p> <p>TAMPA, FLA., 112 Cass St.</p> <p>TERRE HAUTE, IND., 701 Wabash Ave.</p> <p>TOLEDO, OHIO, 520 Madison Ave.</p> <p>TULSA, OKLA., 409 South Boston St.</p> <p>UTICA, N. Y., 239 Genesee St.</p> <p>WASHINGTON, D. C., 1405 G St., N. W.</p> <p>WATERBURY, CONN., 195 Grand St.</p> <p>WORCESTER, MASS., 340 Main St.</p> <p>YOUNGSTOWN, OHIO, 16 Central Square</p> |
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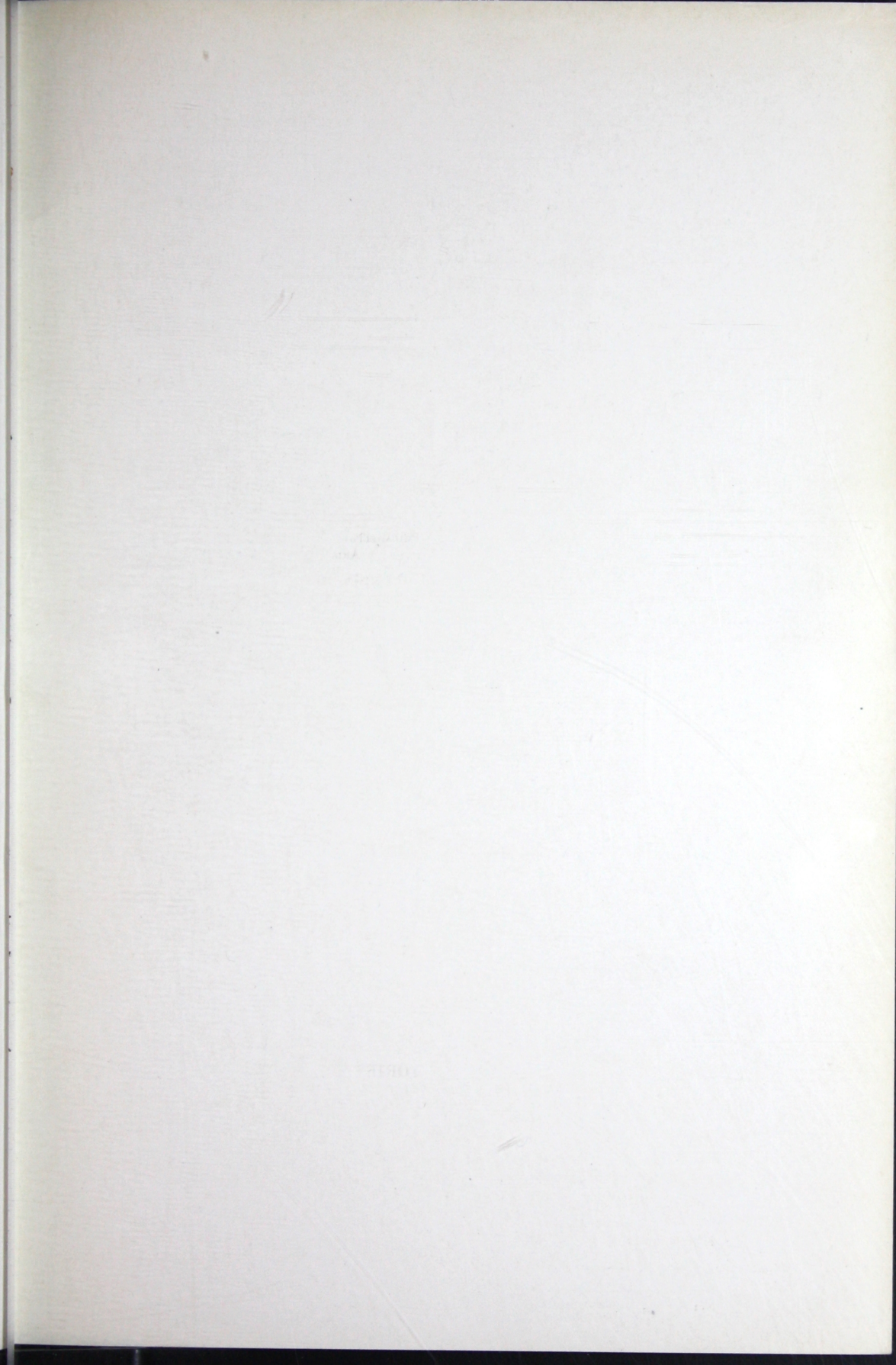
*Stock of lamps at these points.

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MINNEAPOLIS, MINN.

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